

Mills on Wilson's Run

ARCHÆOLOGICAL AND HISTORICAL PHASE I AND PHASE II SURVEYS IN CONNECTION WITH INTERSECTION IMPROVEMENTS TO ROADS 92 AND 100 CHRISTIANA HUNDRED, NEW CASTLE COUNTY, DELAWARE

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PREPARED BY
EDWARD F. HEITE
HEITE CONSULTING
CAMDEN, DELAWARE

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RAYMOND M. HARBESON
CHIEF ENGINEER / DIRECTOR
DIVISION OF HIGHWAYS

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ABSTRACT

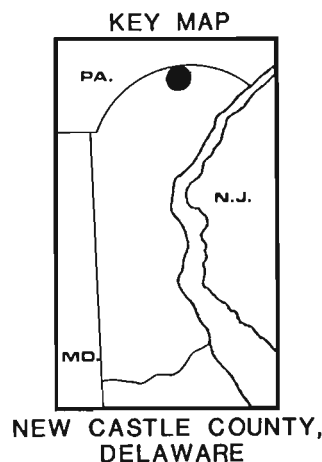
This is a report of Phase I and Phase II archæological and historical surveys on a site near the hamlet of Rockland, in Christiana Hundred, New Castle County, Delaware. This intersection is about to be improved and relocated.

At the Adams Dam site, near the Road 92 and Road 100 intersection, subsurface investigations revealed evidence for a succession of superimposed mill races, which powered a succession of grist and saw mills in the present Brandywine Creek State Park.

An adjacent property, the Henry Francis duPont Winterthur Museum, was added to the National Register of Historic Places on February 24, 1971. The original nomination, for 962 acres, encompassed only the property now owned by the museum. The project area, in Brandywine Creek State Park, was once part of the Winterthur estate under the ownership of Colonel Henry A. duPont, father of the museum's founder. The mill race identified in the project area was a part of the Winterthur estate during a period when the estate's primary function was to supply hay and other requisites for the nearby powder mill through most of the nineteenth century. Since it is an industrial site in its own right, as well as part of the support system for the Hagley powder yards, the mill and the outlying parts of its power system are eligible for inclusion in the Register.

An expanded National Register nomination that includes all of the original Winterthur holding includes the mill ruins and the mill race. The mill and its appurtenant power system are contributing properties in the revised Winterthur historic district.

Removal of the existing roads will afford an opportunity to see elements of the hydraulic power system that have been protected under roadway fill. No further archæological work is recommended in the area to be affected.



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Park management deserve special mention for their patience during a disruptive excavation. The trench across the site left damage only marginally less unsightly than the tornado that followed a few days later.

Robert Howard, of the Hagley Museum and Library offered considerable insights into the operation of the powder yard, and introduced the author to Donald Blevins, stonemason at Hagley. Staff of the general library, picture collection, and manuscript departments of the Hagley Museum and Library were most helpful, especially when the author was trying to thread the intricate web of ethnicity in the Brandywine.

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1. INTRODUCTION

DELAWARE DEPARTMENT OF TRANSPORTATION proposes to improve an intersection near of Rockland, New Castle County.

At the intersection of State Route 92 and State Route 100 in Christiana Hundred, the Department plans to relocate the intersection and the bridge over Wilson's Run, supplanting the existing Bridge 70. The new road will also cross a historic mill race and force relocation of stone walls.

The new right-of-way will be taken from lands of Brandywine Creek State Park and the Henry Francis duPont Winterthur Museum, both former components of the

Winterthur estate when it belonged to Colonel Henry A. duPont.

The Winterthur museum property is listed in the National Register of Historic Places. This nomination is being revised to include the former Winterthur property now part of Brandywine Creek State Park. Landscape and æsthetic areas of significance are being separately considered by the consultants who are revising this nomination (Bower 1990).

In order to comply with Section 106 of the National Historic Preservation Act, the author was engaged by the Department to conduct Phase I and Phase II investigations in the areas of this improvement.

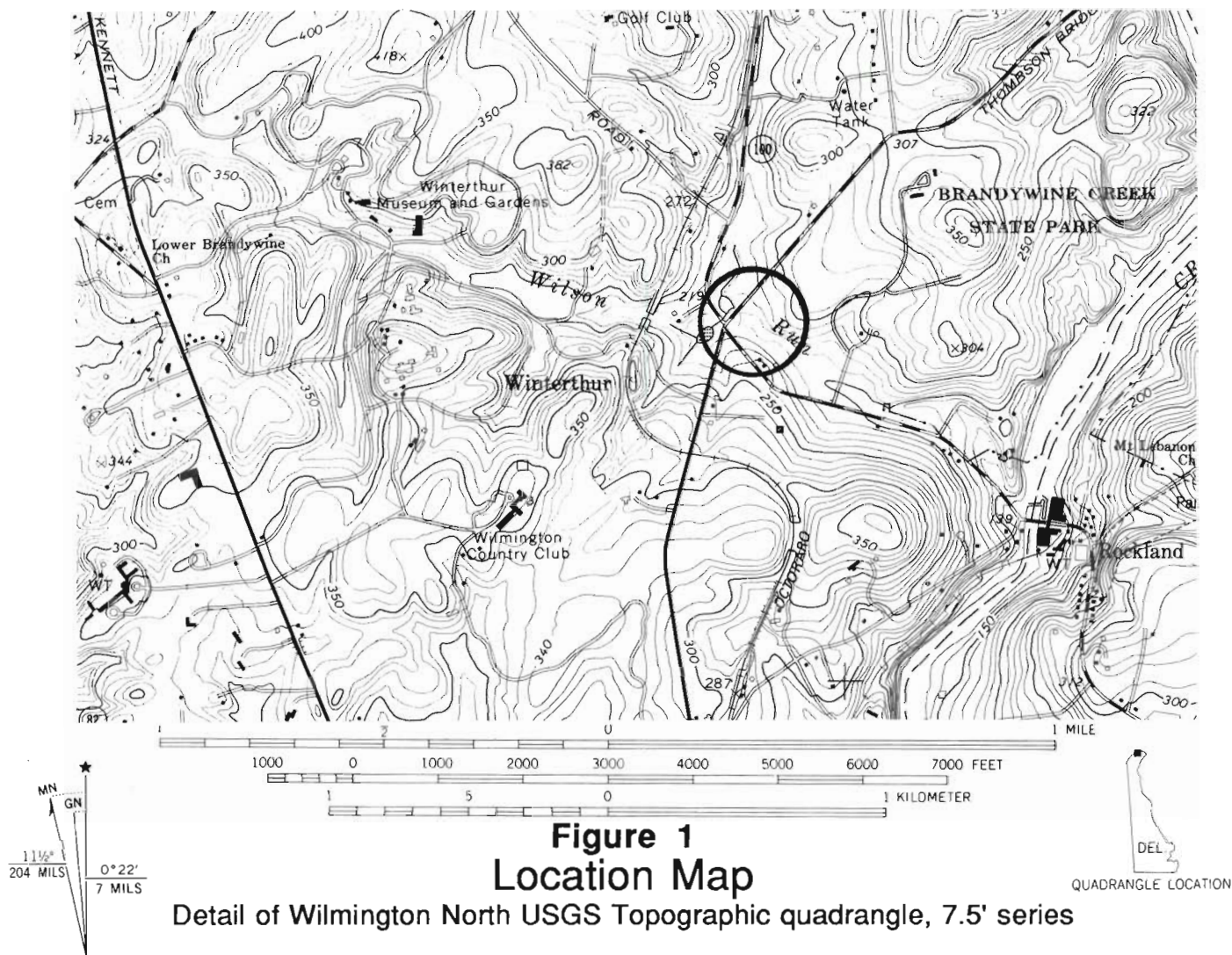
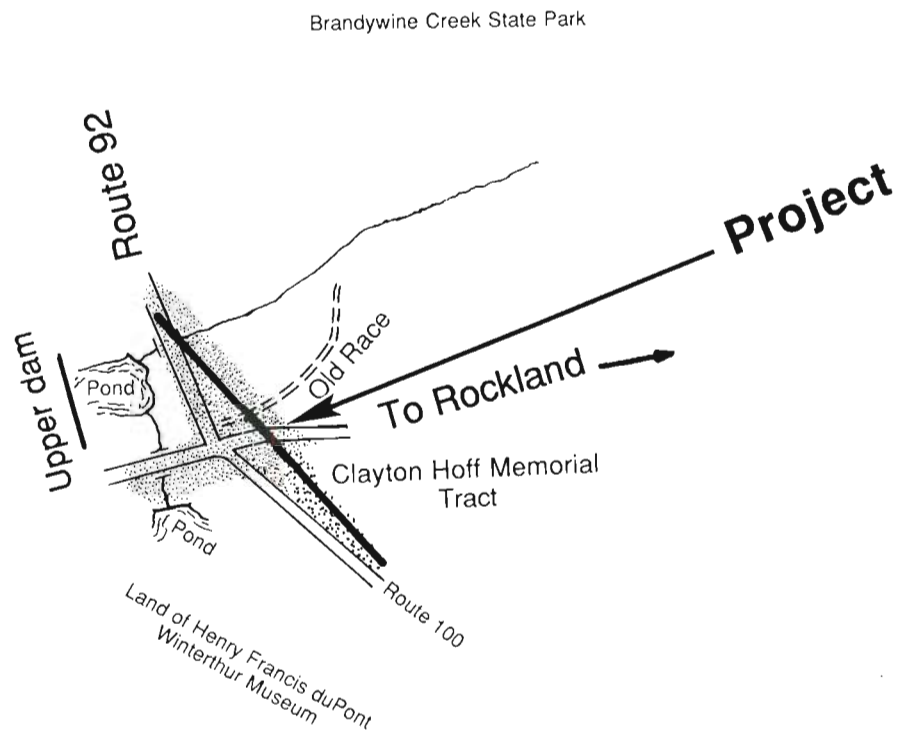
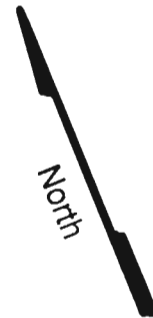


Figure 2
Sketch map
of project
area

Not to scale
Impact area is shaded



2. PROJECT AREA LOCATION AND DESCRIPTION

THE PROJECT AREA lies in the Piedmont uplands valley of Brandywine Creek northwest of Wilmington, in Christiana Hundred.

It is served by a road system radiating northwestward from the city into the Pennsylvania hinterland. Route 100 is not one of the arteries; instead it was created administratively from a series of interconnecting county roads that eventually meander through the countryside to the vicinity of West Chester, Pennsylvania.

On either side of the project area are

larger roads, Kennett Pike (State Route 52) and Concord Pike (US 202), former turnpikes along the ridgetops that linked the Chester County hinterland with the port and market of Wilmington.

Parts of the study area are connected by a very old local road from Centre Meeting to the Brandywine crossing at Rockland. Now called Route 232, the road follows the valley of Wilson's Run. It has most frequently been called Adams' Dam Road or the road to Centre Meeting. A segment is part of Route 100, causing some confusion of nomenclature.

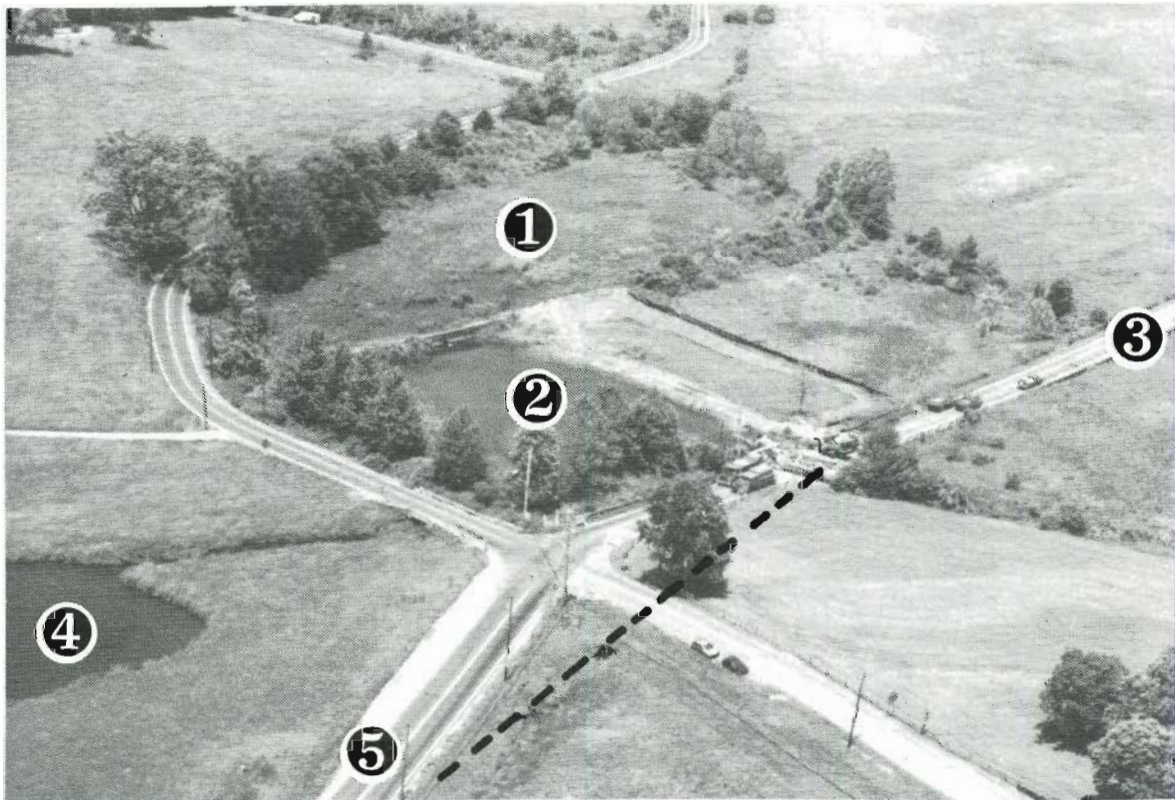


Plate 1

Aerial view of the Adams Dam project area, looking northwest

Photograph by Tim O'Brien during the replacement of Bridge 70, 1989

The last pond that powered the mill (1) is in the top center. The impoundment adjacent to the bridge (2) is recent. Road 92 (3) is at center right. The pond at left (4), on the property of the Winterthur Museum, is a recent addition. In left foreground (5) is Route 100. The proposed new road is shown by the dashed line.

SOILS AND DRAINAGE

Soils belong to the Neshaminy-Aldino-Watchung association, "level to steep, well drained, moderately well drained, and poorly drained, medium-textured soils formed over dark-colored gabbroic rocks; on uplands" (Soil Conservation Service 1970).

Above the Route 100 intersection, the soil is mapped as Codorus silt loam, a moderately well drained soil that occurs on piedmont floodplains. The project site itself is mapped as Hatboro, a class of "deep, wet soils that occur on the Piedmont Plateau." These soils developed on materials that washed from areas of micaceous rocks.

ENVIRONMENT AND SITE LOCATION

The Delaware Piedmont physiographic province is a fertile area of gently-rolling hills underlain by igneous and metamorphic rocks.

The fall line of the Brandywine is not an abrupt cataract. Instead, the stream falls gently through New Castle County to tidewater at Wilmington, providing power for mill seats along the way. This widely-distributed source of cheap and reliable

power was the creek's main geographical advantage

Numerous outcrops along the Brandywine provided ready quarries for building stone, from earliest colonial times. Stone houses were being built during the seventeenth century. Brandywine "granite" was used widely for rubble fill, in such projects as the breakwaters at the mouth of Delaware Bay.

The creek also is a source of fresh drinking water for the population of Wilmington. The creek's pure water was also used by the Rockland paper mill.

PREVIOUS INVESTIGATIONS

Previous investigations in the project area include the cultural resources management plan for the Brandywine Creek State Park, which is liberally quoted herein (Blume, Clark, and Dunn 1990).

The authors of that plan investigated resources throughout the park, and have identified critical areas. In the vicinity of the Adams Dam, they found no evidence of prehistoric activity. Aside from the mill race, the park plan identified no resources in the project area.

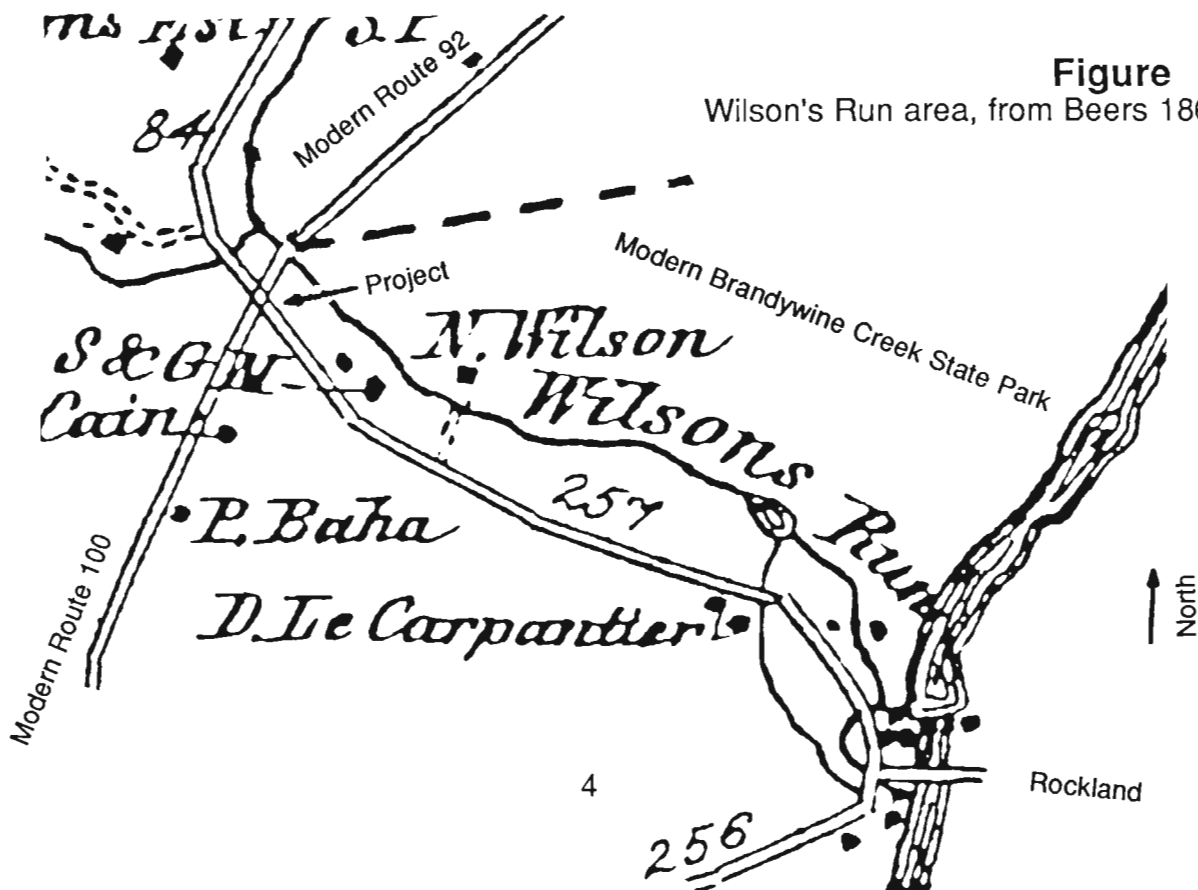


Figure 3
Wilson's Run area, from Beers 1868

3. RESEARCH ORIENTATION AND THE STATE PLAN

PREVIOUS RESEARCH in the region has provided valuable insights into the locations of human activities through time. In some cases, as in the project area, settlement models are so well developed that sites can be predicted with uncanny accuracy, but there is yet much to be learned about human utilization of this part of New Castle County.

INDUSTRIAL SITE DEFINITION

The traditional definition of an archaeological site has been "a place where artifacts are found," which is misleading and unduly restrictive in the context of modern industrial archaeology. Twenty years ago, some archaeologists could define archaeology as "the excavation of data," (Foley 1969:93) and restrict archaeological studies to uncovering that which has been buried.

Identification of sites with artifacts forces researchers to ignore loci where artifacts are not found, or places where the site itself is the artifact, or sites where artifacts are intangible or at least not solid. Intangible artifacts may be found on industrial sites or sites where the general landscape has interacted with, and been changed by, humankind in ways that are subtle and not expressed as traditionally recognizable artifacts.

A more satisfactory, if prolix, definition is one offered by Deetz (1967: 11): "a spatial concentration of material evidence of human activity." This definition distances itself somewhat from the concept of an artifact, as well as from the concept of digging or uncovering.

Industrial sites, in particular, contain elements that do not fit the traditional definition of artifacts. Stream pollution, soil chemicals, odors, and even the acidity of the rain, are artifactual evidence from which human activity can be deduced, even though we do not normally conceive of a gas, a chemical formula, or an effect as an artifact in the sense that a projectile point or a potsherd is an artifact. It is more correct to define a site, particularly an industrial site, after the

example of Deetz, as *a place containing evidence of human agency*.

The object of the archaeologist's attention can therefore be identified as the study of man's place in his environment, or the environment's effect on man, as expressed in measurable phenomena.

Each manifestation of human agency therefore becomes the equivalent of an artifact within a site, the definition of which is more properly broadened to include any place where man has left evidence.

This redefinition is useful, for the holistic industrial archaeologist, since much useful evidence of human agency may be atmospheric, environmental, or even intangible.

In the project area, it turns out, the most important artifact may be an engineering idea expressed in feet above sea level, reflecting the personality of an extremely wealthy civil engineer. The artifact has such dimensions as horsepower and volume, in addition to the established dimensions of superficial size and age. Therefore, the research program concentrated on recovering from mill race remains such topographical data as might later be useful in the interpretation of the mill downstream and the dam that still stands upstream.

Many industrial sites, notably power and transportation systems, are much larger than the landmark structures that attract the most attention. A railroad is more than a station, and a milling system is more than the structure that contains the powered mechanism. In such cases, the entire system must be considered, for the loss of any part can hobble the interpretation or restoration of the whole.

PREHISTORIC MANAGEMENT PLAN

The Delaware prehistoric cultural resources management plan (Custer 1986) and the companion management plan for Northern Delaware (Custer and DeSantis 1986) identify the Brandywine Valley as a high priority area for archaeological research,

both because of development pressures and because of the scarcity of reported sites.

The plan was based upon a cultural ecological or cultural materialist approach, which examines the relationship between an environment and its people.

In the Piedmont uplands, Custer and DeSantis point out, there has been, historically, little environmental diversity. The streams have very narrow floodplains and there are few swamps. Through most of prehistory, the region was forested. Deciduous forests would have had a high carrying capacity for wildlife.

This part of New Castle County is ranked as having poor data quality and low site probability. Yet the plan identifies the Brandywine Valley as a corridor possessing a high research priority because of development pressures.

In the plan is a table, abstracted below, that assigns numeric scores to significant site probabilities by temporal study units. A high probability of significant sites was indicated by a 5, while low was indicated by 1. With a total score of 11.95 for all periods, the "major drainages" group (which includes the Brandywine) was found to be the lowest-ranked area in terms of probability for containing "significant" sites.

TABLE I

AGGREGATE SIGNIFICANT SITE PROBABILITIES
BY TEMPORAL STUDY UNITS (AFTER CUSTER)

Temporal Study Units	Major Drainages	Total for All Areas
Paleo-Indian	2.28	15.61
Archaic	1.86	18.19
Woodland I	3.67	22.6
Woodland II	3.14	22.14
Contact	1.0	7
Total	11.95	

The plan states that Brandywine Valley sites possess high priority for investigation whenever they are found. For the present project, however, these priorities are largely irrelevant, since Blume, Clark, and Dunn have shown that the project area is unlikely to contain prehistoric sites.

THE STATE HISTORIC PRESERVATION PLAN

In order to implement the National Register of Historic Places program, the Delaware historic preservation office has issued a set of documents that collectively constitute the state preservation plan.

The historic contexts list in the Delaware Comprehensive Historic Preservation Plan (Herman and Siders 1989) lists a number of historic property types. The following is a list of property types that are present in and near the project area, as they are grouped in the plan within three of the historic themes, associated with milling and associated transport:

ECONOMIC AND CULTURAL TRENDS

Agriculture - Crops

[not listed: Hay; see page 14, herein]

Agriculture - Methods

Land Improvement

Labor

Tenant

[not listed: Contract Labor Gangs; see pages 18, 28]

Agricultural Orientation

[not listed: Industrial Support Farms; see pages 8 - 9]

Forestry

Saw Mills

Dams

[not listed: Raceways and Penstocks; see pages 28 - 30]

Shipping/Transporting

Land

Roads

Crossroads

Manufacturing

Rural Industries

Saw Mills [see Forestry, above]

Grist Mills

LANDSCAPE

Change through Occupation

Early Industrial/Commercial Sites

Transportation Networks

Land

Roads and Toll Roads

Crossroads

PEOPLE

Major Families and Individuals

[Not listed: Immigration; see pages 19, 28]

The plan divides the state into five geographical areas, the first of which is the Pennsylvania Piedmont, in which the project lies.

For the purpose of creating contexts, the plan identifies five historic periods:

- A. 1630-1730 Exploration & frontier settlement
- B. 1730-1770 Intensified & durable occupation
- C. 1770-1830 Early industrialization
- D. 1830-1880 Industrialization & early urbanization
- E. 1880-1940 Urbanization & early suburbanization

The plan sets priorities for all these various plan elements (Ames et al 1989: 79-82). According to the authors of the plan, "The Piedmont Zone is not a high priority now because much of the historic landscapes of the nineteenth century have already been compromised or destroyed. By the late 1990s the Piedmont will have the greatest number of potentially eligible resources in the state from the early twentieth century and should move up in the Geographic Zone priorities."

Agriculture is the plan's first-ranked priority among above-ground, or visible, resources, followed by settlement patterns and demographic change. Manufacturing is the third priority for above-ground resources.

For below-ground resources, which includes some archaeological sites but not their archaeological attributes, the plan identifies settlement patterns and demographic change as the highest ranking priority for preservation attention. Trapping and hunting is second, followed by mining and quarrying. At the bottom of the list, seventh, is manufacturing.

It would seem that manufacturing is of little concern to the historic preservation planning process in Delaware, and that there is little to be gained from studying and protecting below-ground industrial historic resources in northern Delaware. The opposite is true.

The Piedmont Zone is fifth on the priority list for above-ground resources and is similarly low on the priority list for below-ground resources. The state plan notwithstanding, Delaware history is dominated by industrial history, and industrial sites in the state are among the major practical concerns to preservation interests.

When the plan's composite list of priorities was compiled, the Piedmont fell

near the bottom in every configuration of the data:

Above-Ground

#1: Agriculture

1770-1830±, 1830-1880±

Upper Peninsula, Lower Peninsula/Cypress Swamp, Coastal

#2: Settlement Patterns and Demographic Change

1830-1880±, 1880-1940±

Urban (Wilmington)

#3: Settlement Patterns and Demographic Change

1770-1830±, 1830-1880±

Piedmont, Upper Peninsula, Lower Peninsula/Cypress Swamp, Coastal

Below-Ground

#1: Settlement Patterns and Demographic Change

1630-1730±

Coastal

From this it can be inferred that the state plan assigns low priority to virtually all preservation issues in and around the project area. In practice, manufacturing centers on the Brandywine have received, and continue to receive, lavish preservation attention. Near the project area, the Rockland mills and the Eleutherian Mills complexes have been preserved, as an example.

Since two of the plan's temporal divisions are labelled "industrialization," it seems strange that manufacturing should be lightly regarded among the preservation priorities, especially in view of the rapid erosion of industrial resources.

There must be some hidden significance to the temporal label "early industrialization" and the division called "industrialization and early urbanization," since the plan's first priority is agriculture during those periods, entirely outside the traditional urban industrial districts of the state. Agriculture in northern Delaware during the nineteenth century was, in fact, a component of the industrial landscape, which was not specifically urban, as the research for this paper demonstrated.

Either the temporal labels should be changed, or priorities should be reordered. In the meantime, preservationists will continue

to place a high priority on the "industrialization and early urbanization" period in largely rural contexts, largely in southern Delaware.

COMMERCIAL ORIENTATION

Transportation-related sites are, by definition, an element of commercial history. The project-area sites are commercial and industrial elements of the larger Philadelphia sphere of influence.

From the establishment of Philadelphia in 1682, Delaware has been part of Philadelphia's commercial hinterland.

Even after Delaware broke away from Pennsylvania politically in 1776, local commerce has continued to flow into the Pennsylvania economy. When steam navigation and railroads were introduced during the nineteenth century, Delaware's farmers turned to Philadelphia for access to the national markets beyond.

Wilmington, a commercial satellite of Philadelphia, was a market center for Delaware and Pennsylvania hinterlands to the west and northwest, up the Christina and Brandywine Valleys. Elsewhere in Delaware, Wilmington played no role whatever in the economic system. In terms of regional commerce, the city looked entirely to its westward and northwestward.

To tap this market, Wilmington interests built turnpikes, railroads, and local roads that radiated out from the city. The network of roads we now call Route 100 was never a turnpike, but it served as a secondary artery into Wilmington markets.

The Wilmington and Northern Railroad (FIGURE 4), which penetrated the Pennsylvania hinterland as far as Reading, was an attempt to siphon off some of Philadelphia's natural trade into the secondary market in Wilmington. Instead of becoming a hub, Wilmington became a corridor, through which rail traffic passed en route to somewhere else.

Wilmington's economic isolation from the rest of Delaware was broken with the construction of paved highways around the time of World War I. For the first time,

downstate markets opened for upstate businesses through the highway system.

Wilmington's brief period of statewide economic dominance may prove to have been fleeting, as the state's center of population and influence moves again to the southward and newer networks, based on the Interstate highway system, redirect commerce to other, more distant, centers.

In the history of the project area, Philadelphia interests loom large, but the powder mills are intimately entwined with the larger history of the nation. While the Rockland mills were established by Philadelphia interests, the powder mills were from the start considered instruments of national policy. Neither mill served a Wilmington market, and during the nineteenth century neither company had a significant presence in the life of the city.

The Brandywine banks were, largely, a rural industrial environment detached from the urban industries around Wilmington, a scant four miles away. In the context of the period, "industrial" was not synonymous with "urban" in America.

INDUSTRIAL NATURE OF FARM SITES

During the nineteenth century, industries depended heavily upon their agricultural surroundings. It was impossible to run a factory without a complementary farm, and bigger factories required bigger agricultural establishments.

Christiana Hundred along the Brandywine functioned as a support structure for the mills along the creek. Animals for motive power and transportation, wood for building and fuel, stone for building, food for man and beast, all were provided by farmlands along the edge of the valley.

In spite of their bucolic appearance, the farms of Christiana Hundred's "Chateau Country" are historically industrial in nature. Many acres were owned or controlled by the duPont Company as hay plantations to feed the draft animals; hundreds of other acres fed the workers who lived in the little villages down in the valley. Only in the present century has the valley become largely devoted

to purely residential estates that do not materially support the local industries.

Co-minglings of agriculture and industry were the rule on the Brandywine as elsewhere in America during most of the nineteenth century. In 1832, W. W. Young reported that his company's activities at Rockland comprised several farms, plus wool and cotton spinning and weaving, which "necessarily, are blended with each other, and there is much difficulty to identify them separately with exactness." A Wilmington tanner reported a similar difficulty of separating his tannery from his farms, which he described as "intimately connected" (Porter 1990:61).

LOCAL PRESERVATION ENVIRONMENT

The Brandywine Valley is an area where cultural resources have been lovingly preserved, but at the same time is suffering intense development pressure. Two nationally-known museums, Winterthur and Hagley, abut the project area.

The valley enjoys an active preservation movement, which includes historic and natural features. In some cases, progress has taken bizarre turns that have obliterated the authentic historic landscape, and sometimes in the name of preservation.

Ugly but significant historic sites have been made aesthetically pleasing in the name of preservation, degrading the historical integrity of the industrial landscape.

Historically polluted streams or watercourses are clean and green; historically noisy places have become quiet, and historically noisome places have been made to smell sweet.

Such changes are frequently wrought in the name of history and historic preservation. So that more people can enjoy the open spaces, the construction industry is busily throwing up houses in nearly every neighborhood, diminishing the open landscape that characterized the valley for three centuries.

Hay fields, which once dominated the valley, are turning into subdivisions, golf courses, and lawns. The visual link with nineteenth-century industry recedes in step with the march of the suburbs.

While isolated artifacts of the nineteenth-century industrial period survive, the built environment in the Brandywine Valley today is primarily a product of the twentieth century, erected after the decline of local industry. Suburbanization is an important historical process, and the name of the most recent temporal division of the state plan.

As the state plan predicts, early examples of the suburbanization process soon will be eligible for the National Register.

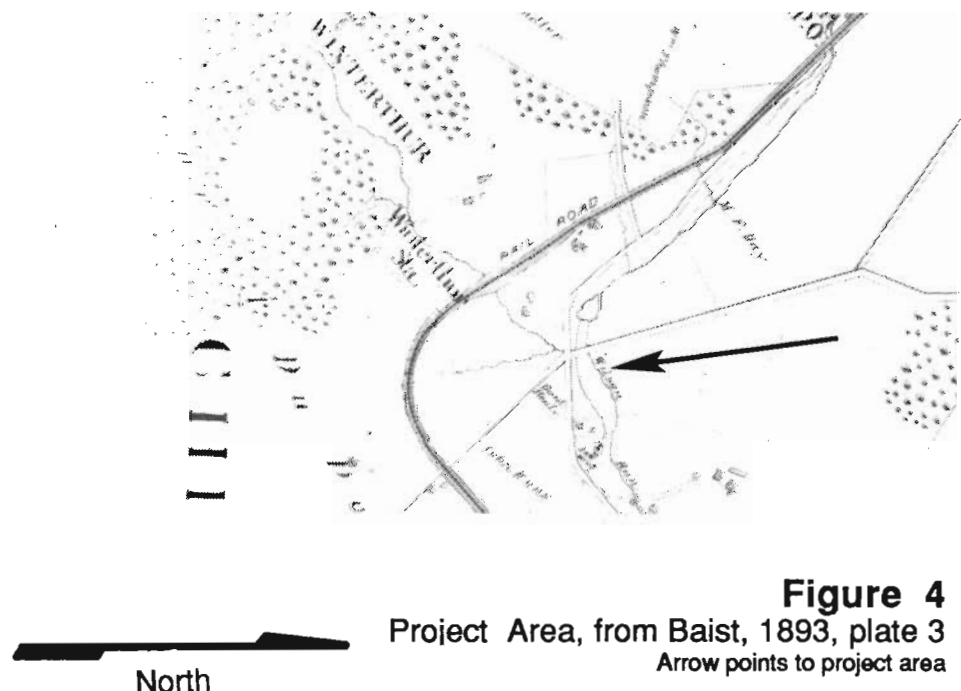


Figure 4

Project Area, from Baist, 1893, plate 3

Arrow points to project area

4. HUMAN HISTORY IN THE VICINITY

PEOPLE ARRIVED in the Delaware Valley near the end of the last (Wisconsin) glaciation (Kraft 1986:31). Glaciers entrapped so much water that the ocean lay fifty miles east of the present Sandy Hook, New Jersey. As glaciers retreated and the ocean advanced, area ecology changed.

During the ten millennia before European settlement, Delaware's climate evolved from glacial tundra to temperate hardwood forest. Man's adaptation to the changing climate was marked by gradual cultural evolution. Custer and DeSantis (1986) have provided a useful table that correlates human and climatic change:

TABLE II PREHISTORIC CHRONOLOGY

Dates	Environmental Episode	Cultural Period
8080 BC	Late Glacial	Paleo-Indian /Early Archaic
6540 BC	Pre-Boreal/Boreal Atlantic	Middle Archaic
3110 BC	Sub-Boreal	Late Archaic
810 BC	Sub-Atlantic	Woodland I
AD 1000		Woodland II
AD 1600		

These changes in climate have forced changes in man's subsistence strategies, family structure, and social organization.

PREHISTORY

Mammoths, musk ox, horses, caribou, and walrus provided food for dire wolf, short-faced bear, and other predators. Man was among the smaller competitors in the tundra food chain, but his skills compensated for his physical shortcomings. Nomadic people of this Paleo-Indian period were among the most skilled makers of stone tools in the world. They would travel great distances to quarry the best flinty cobbles from which they made exquisite spearpoints, knives, and small tools.

Paleo - Indian hunting - gathering society lasted until about 6,500 BC, when the

Atlantic climate episode and the Archaic period of prehistory began (Custer 1984:31). Northern hardwood forests had replaced the tundra, the ocean had risen, and the climate was warmer. Pleistocene megafauna were replaced by smaller game, which required different hunting techniques and tools.

Archaic people fashioned tools made of quartz, a material that is less tractable than the flinty materials that Paleo people had favored. Ground stone axes and other heavy tools appear during this period.

By 3,000 BC, prehistoric society was decidedly different. Because people had stopped moving around so much, regional cultural differences began to appear in the artifact assemblages. Sedentary lifestyles ultimately led to horticulture, complex religious practices, and the accumulation of more, less portable, material goods.

The last prehistoric period, the Woodland, is characterized by larger groups of people living together in villages, using pottery and other heavy or fragile goods that would have been difficult to move from place to place. Woodland people tended to form more or less permanent settlements at places with abundant multiple resources. They sent out hunting parties, but they seldom dispersed whole populations to live off the land in the manner of their hunter-gatherer ancestors.

COLONIAL NEW CASTLE COUNTY

New Castle County was first settled by Europeans during the second quarter of the seventeenth century, first by Swedish settlers and then by the Dutch. Settlement reached the project area after the English takeover in 1664.

It was the Quakers, who flooded the colony with settlers after Penn's takeover in 1682, that brought Western civilization to the project area. Under the Dutch and the Duke of York, local courts had charge of parcelling

out the unclaimed land, but the new proprietor soon concentrated authority in his own land office at Philadelphia. The ensuing period was marked by large grants to Philadelphia merchants and speculators, including members of the Penn family, who effectively controlled access to vacant land for another century. One of these tracts was the Manor of Rockland.

The upper Brandywine, including the project area, was one of the areas settled by the first wave of Penn's Quaker settlers. During the eighteenth century, the creek's abundant water power gave rise to flour, saw, and fulling mills, which were followed in the nineteenth century by paper, powder, and textile mills.

The rolling uplands of Delaware's Piedmont remained largely agricultural during the nineteenth century, in spite of industrialization and urban housing types in the mill villages nearby, in the river valleys. The non-farm population tended to live in closely-packed rows of houses around the milling centers, such as Rockland and Henry Clay. Suburban sprawl, a characteristic of later periods, was unknown.

The surrounding farmlands were as much a part of the industrial scene as the mill villages. Even though the valley was served by short-line railroads, most industrial transportation still depended upon horse power. Every factory had its stables, pastures, and hayfields to support its draft animals.

In a larger sense, the upper valley mills can be interpreted as rural industry serving Philadelphia and even wider markets,

beyond the purely local mills found elsewhere. Some of the mills were grist and saw mills, serving the needs of nearby farmers, but others functioned to process raw materials from distant sources for distant markets.

Thus it is difficult to distinguish between rural and industrial features of the landscape or to discuss the villages in isolation from their surrounding farms. One of the sites in the present project is part of a mill property in a "rural" setting, while the other, a short distance away, is a "village" environment. Both are decidedly industrial.

Much of the land in the area belonged during the nineteenth century to the duPont powder business, which was then a family-owned partnership. Members of the family appropriated the farms as estates, creating the nucleus of what has become known as "chateau country," the vanguard of suburbanization.

Best known of these estates is Winterthur, which the last duPont owner endowed as a museum of early American decorative arts. Part of the Winterthur tract became Brandywine Creek State Park, while the family's first home at Eleutherian Mills became part of the Hagley Museum.

At some time in the future, the post-industrial environment known as "chateau country" may become a theme worthy of consideration for future preservation activities. However, for the purposes of the present study, "chateau" period landscape was a peripheral consideration, since the existing features in the right-of-way largely belong to the industrial period.

5. HISTORY

AT THE INTERSECTION of Route 100 and Route 92, intersection improvements will require replacement of Bridge 70 over Wilson's Run and will cut through the race (FIGURE 2) that once powered a saw and grist mill. Adams Dam, which gave its name to the adjacent road, was built for this race and altered several times.

The present concrete and stone dam on the site contains a raceway opening, but the race is not readily evident between the dam and Route 92.

The project area was first patented as the "Warm Lands" tract by John Grigg in 1685 (New Castle County Warrants and

Surveys U1 #43). Grigg probably did not live on the property, since he already was settled elsewhere nearby.

Samuel Underwood bought the tract, which was confirmed to him in 1692 (New Castle Deed Book C-1:66-70). He lived on the property when he died in 1722 (New Castle Archives Wills, 1722). Blume, Clark and Dunn (1990) conjecture that the Underwood house site was close to the creek, and not in the project area, but it has not been definitely located.

Joseph Underwood, Samuel's son, owned part of the farm, plus some other land that he bought in 1735. This included the



Plate 2
View of the project area, looking north along Route 100

entire project area east of Adams Dam Road. Before 1771, during William Underwood's tenure, there was said to be a mill on Wilson's Run (New Castle Deed Book Z-1:113-115).

William Underwood lost the tract in a lawsuit in 1788, and in 1789, it was sold by the sheriff to William Wilson (New Castle Deed Book H-2: 367-369). According to Zebbley (1940: 106), Wilson built the first mill at this site on Wilson's Run.

Thompson's Bridge Road (PLATE 3), which passes through the mill seat, began in 1771 as a private road laid out for Thomas Wilson. When William Wilson died, he left the mill seat to his son, Samuel.

Growth of industries at Rockland led to the opening of the present road, known as Adams Dam Road, Road 232 and Rockland Road from Centre Meeting to Gunning Bedford's house, Lombardy Hall, on the present Concord Pike. The petition for the road cited the fulling mill for finishing wool cloth, a saw mill, a barley mill and an "extensive paper manufactory" at Rockland as the justification for opening a new road (New Castle Road Book 1794-1809: 79-80, 112).

Jesse Chandler built another mill on this seat around 1835, which soon burned. By 1854, Alexander Adams was keeping a mill on the seat, and the name Adams Dam became fixed to the place. The 1868 Beers *Atlas* shows a saw and grist mill on the site (FIGURE 3, PAGE 4).

After Alexander Adams died, Colonel Henry A. duPont bought the mill site. Scharf states that the grist mill still stood on the site in 1888, but the Baist atlas five years later shows only a sawmill. Scharf (1888:886) adds, "The water power being weak, it has a small capacity." Frank Zebbley (1940:106) listed the last operators of the mill as Mr. Clark, Mr. Ewing, and Mr. Ed Ely.

Zebbley also states that the mill closed in 1910; other sources indicate that Colonel duPont renovated the sawmill and operated it for some time thereafter. Over the years, he obtained title to the land now contained in the state park, which he operated as part of his Winterthur farms.



Plate 3

Thompson's Bridge Road (Route 92)
looking north from the present
intersection.

Between this site and the Brandywine, Wilson's Run was harnessed for other mills. There was a fulling mill on the run during the colonial period, operated by Thomas Hollingsworth. About 1812 Caleb Kirk had a cotton mill on the run, which was later turned into a tinware shop by the Le Carpentiers.

DUPONT COMPANY FARM MANAGEMENT

General Henry duPont, who died in 1889, was the son of the founder of the duPont powder enterprise. From 1850 until his death, he not only managed the powder works, but his own plantation of approximately 2,000 acres and a similar-size holding owned by the company.

General duPont was a trained engineer, West Point class of 1833, and supplier of half the nation's explosives during the Civil War, at a time when he was also head of the state militia (Wilkinson 1961:270). In 1862, when income tax returns are first available for the richest citizens of Delaware, he had the highest personal income in the state, \$270,000 a year; his nephews Irène and Lamot, received the fifth and sixth biggest incomes in the state (Hancock 1971: 257).

For its first century, the company was a partnership of near relatives, one of whom

was the managing partner and head of the family. General duPont and then his son, Colonel Henry Algernon duPont, held that dual position until 1902, when the company was incorporated as a modern-style stock company under the control of a new generation of cousins.

Ancillary businesses sometimes became inextricably intertwined with the business of the company. Henry duPont was a founder and president of the Wilmington and Northern Railroad, the Reading branchline which served the area. It is now the Octararo Railroad.

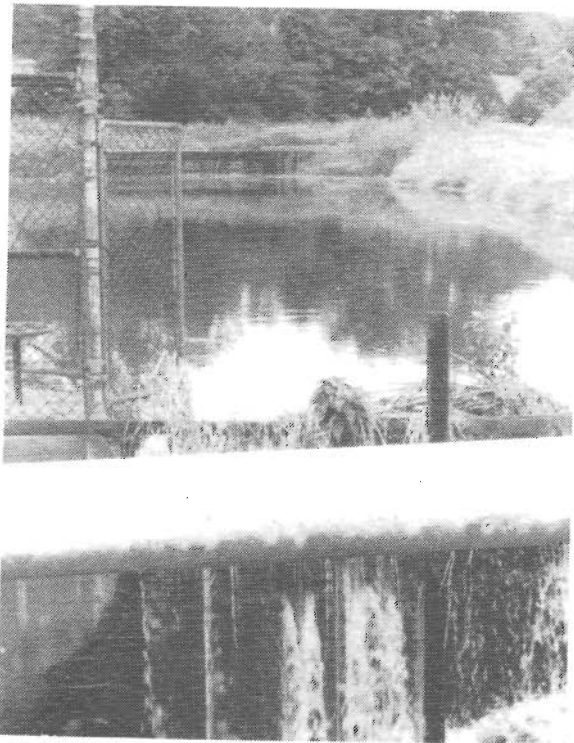


Plate 4

Dams on Wilson's Run

This picture, taken from Bridge 70 looking upstream, shows the upper dam, in background, on the site of the earlier Adams Dam. The smaller dam in foreground is more recent and was not part of the power system.

Colonel Henry duPont electrified the powder yards by installing a hydroelectric

plant, and then built service lines at his own expense to Winterthur; he then carefully paid his household electric bills to the company and reimbursed the company for powder workers who unloaded cars on the family railroad siding.

During the partnership period, family members living nearby could call upon company resources for virtually all the necessities of life. Book balances at the office kept financial arrangements in order, but the workers were unaware of the intricacies of management (Gentieu: 3, 11).

Hay was a major farm product; company hay books record sales to various family members, outside firms, and other individuals. Hay fueled the powder mill's carriages, which remained largely horse-drawn.

General duPont's personal account books with the company have survived; since virtually all of his personal business was handled through the company, the detailed accounts provide a running narrative of work on the Winterthur estates.

Powder yard workers could be detailed to the company or family farms, sometimes for months at a time. Powder workers fired for drinking were sometimes exiled to lower paying jobs at the farm until they took the pledge (Hancock 1958).

After General Henry died, company crews no longer routinely worked on the farms he had owned personally. Layoffs, especially of carpenters, followed. During the ensuing unrest, several company barns were torched, with considerable loss of hay and buildings, but no fatalities. When part of the mill exploded mysteriously in 1890, the barn burners were suspected. (Pryor 1977:61)

Barn burning was the kind of attack modern guerillas would call a surgical strike, cutting at the economic base without inflicting unnecessary casualties. The hay in the barns was vital to the company. Without its own hay supply, the company suffered a severe operational disadvantage, to say nothing of the expense.

The practice of company workers serving on family farms continued, however,

on a reduced scale, as Colonel Henry's papers indicate. Like his father, Henry Algernon duPont was a West Point graduate; he was awarded the Congressional Medal of Honor during the Civil War and ended his public career with a seat in the United States Senate.

He acquired and improved the property now in Brandywine Creek State Park, which was dispersed among his relatives after his death. His son kept the core of the original Winterthur estate until his death, when it became the Henry Francis duPont Winterthur Museum.

The transition from the old company to the new company would result in massive changes to the landscape of Christiana Hundred and to the structure of American business. With one stroke, duPont was transformed from an archaic partnership structure into the prototype for the American twentieth-century corporation.

In the transition, the feudalism and paternalism of the company changed, if it did not completely disappear. A legacy of the old plantation system is the company's benefit system, still one of the more progressive in American industry.

STONEWORK, FARMS AND POWDER

In the project area, the most frequently cited relics of company labor on the farms are the stone walls. These precisely laid decorative walls are capped with dressed courses of capstones, their corners well squared. Obviously not a merely agricultural stone fence, the walls seem out of place on a minor road at the back end of a farm.

Several varieties of stone wall (PLATES 5-10) are found in and near the project area, ranging from extremely crude utilitarian walls to extremely decorative.

Just east of the project area, on the north side of Road 232 is a dry-laid retaining wall of coursed stonework (PLATE 5). The wall is unfinished, and may be the type called "temporary" on the estate maps. There is no attempt to square the capstones or to fit the stones exactly. Similar retaining walls are found throughout the Hagley yards and in

such places as the edge of the mill race farther down Wilson Run.

There is evidence that Colonel duPont used this kind of stonework, since the race in its present form was built under his direction.

Bordering the present Winterthur Museum property is a length of stone wall along Route 100 that is also coursed (PLATE 2), but not as regular as ashlar, masonry. In this case, the stones are well fitted and capped. The capstones have been dressed on the street side but are left irregular on the back; the top is well levelled (PLATE 6) This wall borders property that was owned by duPont relatives long before General Henry bought it in 1867.

On either side of Thompson's Bridge Road are stone walls of a different, more affected, style. These walls are laid very precisely and mortared, but in imitation of rubble stonework. Like the wall at Winterthur, these walls have a course of dressed capstones.

In spite of the fact that the wall's face is quite smooth, the rubble effect has been carefully cultivated, to remove every hint of coursing, except in the capstones, which are closely fitted, with very few fillers. On the backsides, these walls are unfinished (PLATE 8). These latter walls represent a much higher level of finish than the others in the project area, and probably belong to the period after Colonel Henry bought the site. The wall on the west side of Thompson's Bridge Road seems to stop at the original location of the mill race, which Colonel duPont rebuilt.

THE STONE WALL LEGEND

Oral tradition at Hagley relates that the duPonts kept a large force of largely redundant Italian stone masons on the payroll for a practical reason. The redundant Italians have become the stuff of legend.

Powdermaking is extremely perilous work, subject to frequent and explosive accidents. When E. I. duPont built the mills, he designed them with three strong masonry sides and one flimsy wall facing the Brandywine. When a mill exploded, the force of the blast, and the remains of its occupants, would be thrown across the Brandywine.



Plate 5

Rough coursed utilitarian wall along road 232 east of the project area, probably not intended to be permanent



Plate 8

Back side of the wall shown in plates 7 and 9

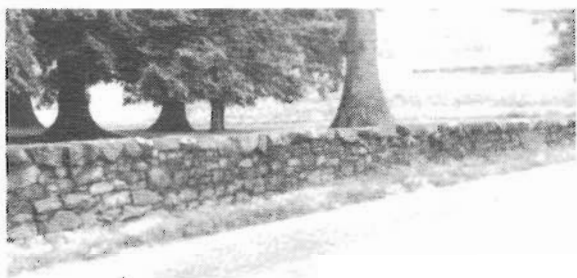


Plate 6

Coursed stone wall along Route 100 bordering Winterthur with well-dressed capstone course

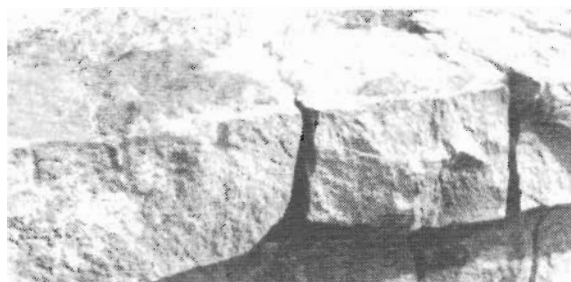


Plate 9

Detail of the finish of the wall shown in plates 7 and 8



Plate 7

Face of a rubble-style stone wall on the east side of Thompson's Bridge Road, in the project area

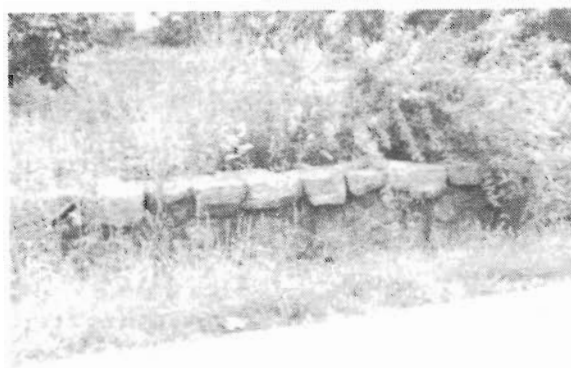


Plate 10

Wall along Route 92 between the intersection and Bridge 70

Being killed in an accident, was called "crossing the creek," and very few years passed without at least one explosion.

The first job after an explosion was to gather the frequently dispersed remains of the victims. The second job was to rebuild, eradicating all trace of the accident as quickly as possible. Grisly reminders of occupational hazards are bad for morale.

Blasts almost always precipitated a few resignations, and worker confidence plummeted as long as the ruins were visible. The Company cared for widows, paying them a pension and allowing them to keep their company houses and take boarders. Children of deceased powder employees were also cared for. Healing after an accident was a matter of extreme urgency.

Since the massive machinery was set in stone beds, precise stone masonry was essential to the operation of the mill; it was therefore necessary to employ the most highly skilled masons.

When they were not building or rebuilding the factories in the powder yard, the Italian masons were kept busy on the farms, building fine walls if there were no buildings to erect. At least this is the folklore.

The present stone mason in Hagley Yard, Donald Blevins, learned his trade from his uncle, Worth Blevins, who in turn had learned from the last of the Italian stone masons. Mr. Blevins pointed out that walls of the type found in the project area are located throughout the company and family farms, everywhere exhibiting the same fine finish, including a razor-sharp edge which was cut after the capstones had been set in place. In the yard, some of the utilitarian stonework is not nearly as well finished as the stone walls on the farms.

THE MONTCHANIN ITALIANS

The legend of the company-employed Italian stone masons is deeply ingrained in the folklore of the powder yards, but the truth is somewhat more complex and just as interesting.

Powdermen were, by and large, Irish. The Company even helped them come to America. Italians were outsiders.

In Montchanin was a small settlement of Italian stone masons, who have been credited with having built most of the work at Winterthur and Hagley (Thompson 1983:33).

First of the Montchanin Italians was said to have been Marcellino Festo, who arrived after the Civil War and soon became a foreman of the stone masons.

Michael Gallo, who arrived in Delaware in 1882, worked for the Wilmington and Northern as a stone mason, as did his neighbor and countryman Ralph Tavani. They worked along the railroad as far north as Reading, living in a private car that was spotted in Montchanin over the weekends.

Michael Gallo, the only Italian stone mason listed along the Brandywine in the 1897 state directory, never appeared on the duPont company payroll. Gallo later went to work for the city of Wilmington; Tavani later worked for Colonel Henry A. duPont and his son Henry Francis, until he died at Montchanin in 1939 (Errigo 1947:628-629).

The first Catholic church in the neighborhood was St. Joseph's on the Brandywine, an emphatically Irish institution surrounded by Irish social organizations. Since there was friction between the Irish and Italian communities, the Rockland and Montchanin Italians tended to fraternize whenever possible with their countrymen in the Wilmington neighborhoods.

Italian powder workers at Hagley rented pews at St. Joseph's and subscribed to its construction fund, according to the company payroll or "petit" ledgers. At least eight Italians on the company payroll in the 1889 petit ledger had their pew rents deducted from their pay.

Although they attended St. Joseph's, Tavani and Gallo were among the builders of St. Anthony's Church in Wilmington, the Italian national parish.

STONEMASONRY AND ETHNIC FOLKLORE

Although they are popularly credited with building both the farms and the mills, the Italians were not the only stone masons in Christiana Hundred. At the village of Henry Clay, near the powder mills, were company-connected stone masons, at least three of them named Conly, Conley or Conelley.

When General Henry was renovating the Winterthur farm for his newly-married son in 1874-1875, he reimbursed the company for a large amount of construction work. Company carpenters are named individually in the records, but all the masonry work was provided by John Conly, who also billed the company for fuse, hauling, and cement. (Hagley Museum and Library, E. I. duPont de Nemours and Company papers, Series 1, part 2, series M (9), miscellaneous bills 1871-1878).

Throughout the last fifteen years of General Henry's life, Conly provided masonry work in lump sums, while individual workers from the powder yards did other chores on the General's farms (Hagley Museum and Library, papers of Henry duPont, Group 7, Series B, Box 11).

John Conly's accounts indicate that he was more than a simple crafts foreman. Company General Ledger 6, for 1878, shows John Conly paying \$236.41 for three months rent; James Conly paid \$37.50 rent for the same period. For January 1878 alone, John Conly was paid \$2,830.13. At the same time, powder workers made about \$40 a month and paid \$9 a month house rent.

In the 1871 state directory, James Connelley, mason, is listed at Henry Clay; by 1891, there was a James Conly, mason, at 819 West Fifth Street in Wilmington. Neal Conly appears in the 1882 state directory as a coal dealer at Henry Clay.

In the petit, or payroll, ledger for 1889, John Conly was on the company payroll at \$3.15 a day and Frank Conly was listed on the page with him at \$1.45 a day, probably reflecting a father-son relationship, since they were paid together. Their combined pay, about \$1,500 a year, equalled that of junior members of the duPont family.

Stone mason Samuel Frizzell was paid \$2.65 a day. Stone masons on the company payroll typically worked about 21 days a month, while powdermakers worked a six-day week and were paid by the month.

By 1891, Neal was listed in the directory as a mason at Henry Clay and John Conly was listed as a foreman. John was still on the payroll in 1894 at \$3.15, but Frank had been promoted to \$2.65, the pay of a master stone mason.

The 1897 directory lists Frank Conly as a mason at Henry Clay and still lists John as a foreman. The other masons resident at Henry Clay were named Samuel Frizzell and Thomas Montgomery.

Unlike their Irish and Italian neighbors, the Conly family were not Catholics. In 1887, James was a warden and John and Neal were vestrymen of Christ Church. Henry A. duPont also sat on the vestry of this Episcopal church his family had built on company ground (Scharf 1888:892).

Neal and John Conly eventually became partners in a firm called Conly Brothers, listed in the 1908 Wilmington directory as dealers in coal, wood, lime, sand, cement, and crushed stone, who provided light and heavy hauling from the corner of Front and Madison in Wilmington. John continued to live at Henry Clay, while Neal lived at 620 West Front Street, near the business.

The Conly connection with the company appears to have been peripheral; they were all stone masons at some time in their careers, and they were residents of the company's powdermaking community at Henry Clay.

John appears from the record to have been a labor contractor and supplier of masonry supplies to the company under the General. Later he joined his brother Neal in the coal and bulk building materials business. Between these two ventures, John was employed as a company foreman.

What remains undocumented is the ethnicity of Conly's crew. They may have been Italian, and they may have lived at Montchanin.

His relationship with the Montchanin Italians remains unclear, but the tradition connecting the Italians with stonework on the farms is so strong that he must have been the middle man.

The connection of Italian stoneworkers with the powder yard and with the farms appears from the record to have been less direct than has been traditionally assumed. The details of this chapter in ethnic history must be left for future labor historians to decode.

ITALIANS IN THE HAGLEY YARD

At the time of the Civil War, the Hagley workforce could be described as mostly Irish, with a few Frenchmen and Germans. During the last quarter of the nineteenth century, a few Italian names began appearing on the petit ledgers as powder yard workers, but not as stone masons.

In the 1874 petit ledgers, the only Italian names are of Joseph and John Ferraro, both of whom lodged with Mary McPherson. They were paid monthly salaries of \$41 and \$36.50, typical of powder workers. Five years later, the Italians were Joseph and Samuel Ferraro and Peter Vescovi.

In the 1884 ledger, the Italians in the yard were Edward Beaconi, Samuel Ferraro, James (Giacomo) Persoglio, Francisco Rodino, and Charles Sicco. Persoglio's pay amounted to \$70 a month, while the others made from \$40 to \$42.50. The Italians by now were enjoying company-financed passage from Europe for their relatives.

Rodino's cousin, Joseph Consano, borrowed his passage money from the company. Only one Italian, Beaconi, rented a house from the company; Rodino boarded with Mary McPherson, but the others found their own housing. Beginning about this time, Italian given names were rendered in the original, rather than being anglicized.

By 1889, Consano was making \$47 and his son Joseph, Jr., was on the payroll at \$40 and paying board to the father. Rodino was the only Italian renting a house from the company; none were boarders at company

houses. All the Italians were paying pew rent to St. Joseph's Church through the company. Giacomo Persoglio still was the highest-paid Italian in the yard, at \$70, and was joined by a kinsman, Joseph.

The 1894 ledger lists only Samuel Ferraro of all the Italians from the earlier lists. He was joined by Luigi and Joseph Bonifacio, Charles Gaino, and Dominique Pissano. Only Joseph Bonifacio rented a house from the company, and none were boarders.

This brief survey of the records suggests that Italians working in the yards were socially outside the predominantly Irish Henry Clay community, since most of them lived off the company property. The folklore bears this out.

None of them worked at the day rate characteristic of the known stone masons, such as the Conlys, the Frizzells, and Thomas Montgomery.

Nor did the Italians stay in the yards for generations, as the Irish families had.

Sons of Italians moved away, and only Samuel Ferraro stayed more than ten years on the payroll of the old company.

During the period, Italian powder workers began to partake of company paternalism, including loans for passage, but their entry into the community was very slow. They tended to live away from the property; even though they participated in the religious activities of the predominantly Irish church, they had their own ethnic pursuits and social organizations.

Since they represented a detached element of the Henry Clay community, the first Italian powder workers may have become confused in the folklore with the Italian stoneworkers, who did not work directly for the company during the same period.

The extremely personal nature of duPont company and family management during the nineteenth century leaves the division lines blurred, except in the ledgers, which are filled with code that some future historian must decipher if the full story of labor on the farms is ever to be understood.

6. FIELD INVESTIGATIONS

THE PROJECT AREA at Wilson's Run consists of a corridor crossing the valley of the stream somewhat east of the present road. The corridor crosses upland, an abandoned mill race, the stream, and the floodplain of the stream (FIGURE 5).

Soils in the project area are Hatboro silt loam. These soils are the wettest and most poorly drained in the New Castle County Piedmont. Uses of such soils are extremely limited by their wetness (USDA, SCS 1970). Therefore, the project area has a very low probability of containing sites of prehistoric or historic human habitation.

Nearby is an area of Codorus silt loam, which is characterized by moderately well drained gentle slopes along waterways. In preparing the park's cultural resources management plan, Cara Blume tested two small areas of Codorus soil on either side of the run, a short distance southeast of the project area (Blume, Clark and Dunn 1990). The three tests uncovered no prehistoric evidence and a few historic artifacts typical of a cultivated field. The tests terminated in rocky soil between 20 and 35 centimeters below surface.

In conclusion, Blume and her associates determined that "No prehistoric sites are likely to be preserved on these eroded terrace settings," of which the project area is an example. Therefore, prehistoric archaeology was at best a peripheral consideration in the present project.

Just south of the project area is a complex of buildings associated with the former Wilson sawmill and gristmill complex (N-1397, 7NC-B-30). This mill system operated into the twentieth century, most lately as Colonel Henry A. duPont's sawmill. The existing concrete mill ruins apparently date primarily from Colonel duPont's era. A fuller history and assessment of significance will be found in the park management plan.

The project area crosses the race that powered this mill, as well as the water source, Wilson's Run. Since dams over the run today are obviously modern, it would be useful to know the location and elevation of

the original dam or dams. The race has been truncated by the existing Thompson's Bridge Road, making it difficult to follow above the road. A topographical survey was therefore necessary to tie together the broken line of the race and its vertical position relative to the mill ruin.

Under the present road, there should be remains of earlier raceway bridges. If the race was filled during a subsequent rebuilding of the road, there is a possibility that it survives intact under the fill. Removal of the road should therefore reveal considerable detail about the successive hydraulic systems that have served the mills through time.

The race in the open field southeast of the present road has been smoothed by erosion, but its outline is clearly visible. It was determined that a test trench into the race would permit an assessment of the value of this feature in the interpretation of the mill complex.

In view of the high potential for information recovery in the raceway and the low potential for prehistoric sites, it was decided to concentrate on the race.

The first test (PLATE 11) was a hand-dug trench ten feet long and about 18 inches wide (FIGURES 5 AND 6) across the apparent edge of the mill race berm. In this location, the race had been considerably flattened, compared to the remains a short distance to the east.

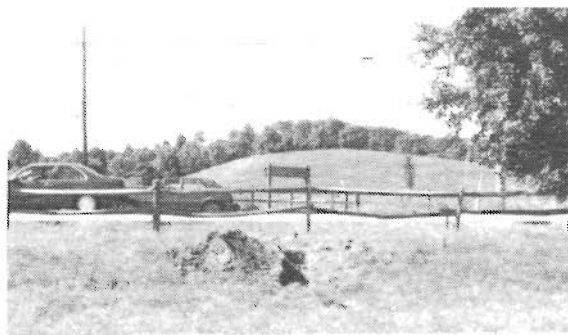
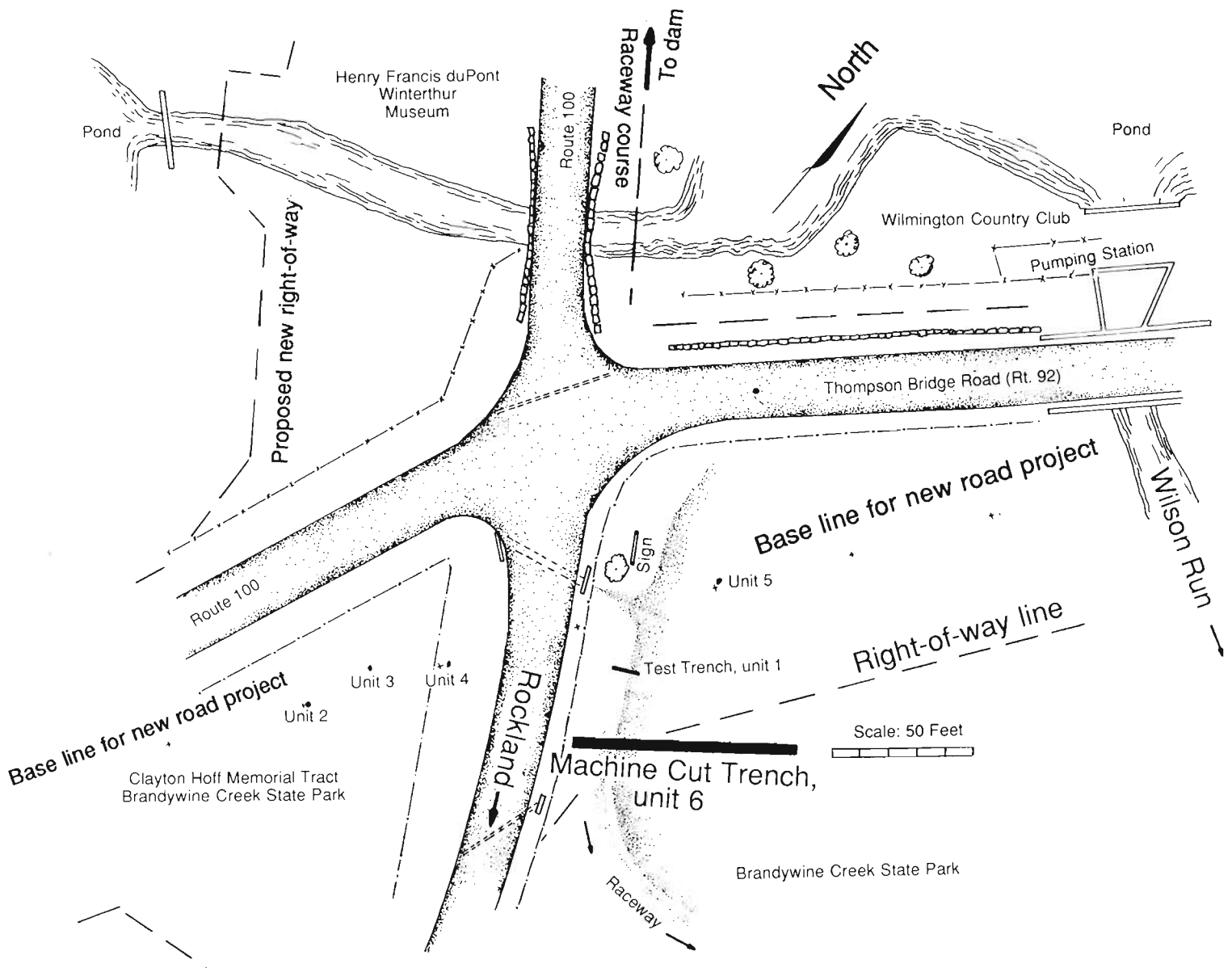


Plate 11
View southward across unit 1

Figure 5
Plan of excavations at the
Road 92 and Road 100
Adams Dam project area



At the surface was a refined pebble-free turf apparently prepared for landscaping purposes. Under this layer was a uniform brown clay fill, which overlay a gravel-filled depression that appears to be a roadway. This lay on top of another uniform brown clay fill. On the high side of the trench, the hard yellow clay subsoil had evidently been cut down to make a depression for the raceway in the hillside.

The yellow clay subsoil gave way at the bottom to a layer of black muck filled with organic matter; this level could not be investigated because it filled almost immediately with water. Near the toe of the slope, some large rocks were found in place.

This small hand-dug trench demonstrated that a larger, deeper and better drained trench would be needed to interpret the succession of events in the history of the race. A machine-dug trench was therefore sunk into the race a short distance to the east.

Even though the area was unlikely to contain prehistoric or historic artifacts, a few test pits were in order, just in case the predictions were wrong. Four holes were dug with a post hole auger, down to the yellow apparent subsoil. The soil from the holes was screened.

Three of the pits were situated in the Clayton Hoff Memorial Tract. Tests 2, 3, and 4, were 50, 60, and 65 centimeters deep, respectively. The only artifact was a lag screw, not saved, in test 4.

In the valley below the mill race, another auger test, number 5, encountered the same uniform reddish brown clay soil to a depth of 40 centimeters. From that level, down to yellow soil at 60 centimeters, the fill contained red brick chips and lumps of coal, indicating that the floodplain had been heavily scoured in relatively recent times.

Since subsequent development had obscured the race upstream from

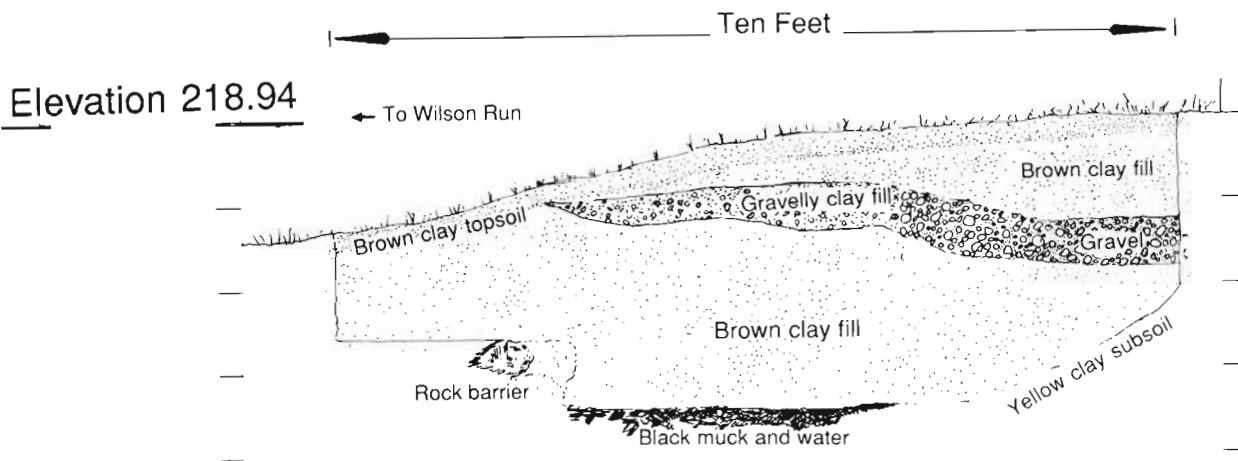


Figure 6
Test Trench, unit 1, east profile

Thompson's Bridge Road, the Department dispatched a survey crew to record the vestiges of the water power system features before they might be destroyed by construction of the new intersection. This survey clearly showed that the existing dam was built to serve the mill, the remains of which still are preserved on the park property.

The machine cut trench, opened September 27, extended eighty feet long and four feet wide (FIGURE 7). At its deepest point, the trench was more than six feet deep. Beginning point was chosen as near to the road as possible, in order to intercept any back side that might exist. As it turned out, the cut apparently barely missed the back bank.

The machine-cut profile revealed a series of construction stages of the race, probably spanning more than a century. Periods of abandonment and rebuilding were visible in detail.

At least three mills are documented on this seat, the duPont sawmill (PLATE 13, PAGE 28) being the most recent. Just before Colonel Henry duPont rebuilt the mill, it was supposed to have been abandoned for lack of enough water.

The profile reveals that several operators had attempted to raise the race. Since a miller is concerned with the top, or head, of the race, the bottom of the race can be allowed to fill as the walls are raised; this is apparently what happened here on more than one occasion. Finally, the race was filled in and a gravel metalling was installed. This was replaced by a layer of second gravel, probably to create a dry bridle path or cartway.

The first raceway, represented by strata 8, 9, and 10, was dug out of the natural subsoil at the edge of the slope. Its wall was not well-defined and while it was open, it was allowed to fill with rotten organic matter, which slopped over the edge.

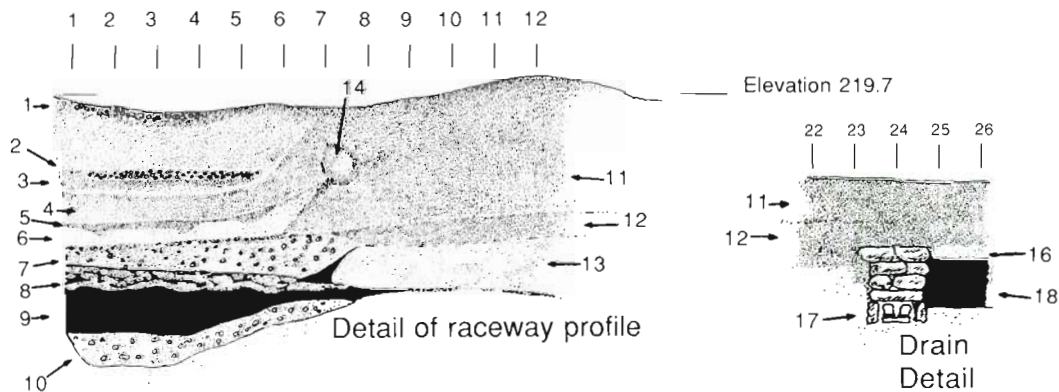


Figure 7
Profiles of Unit 6, machine cut

See table 3, page 24,
for interpretation

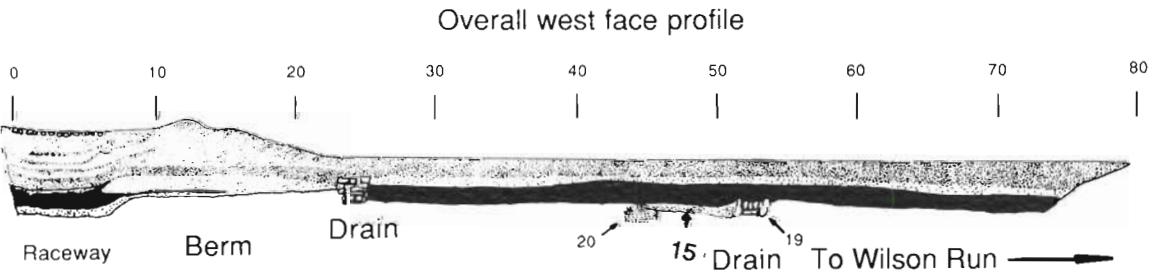


TABLE III

STRATA IN UNIT 6, MACHINE-CUT TRENCH

Refer to Figure 7, page 23

1. Brown clay loam fill, topped with two or three inches of crushed gravel
2. Thin layer of pebbles, 4.5 feet wide and an inch thick at its center, forming part of the interface between fill layers.
3. Layer of brown clay loam fill, about 5 inches thick, yellow in the bottom inch. The yellow line extends up the slope under layer 1.
4. Layer of brown clay loam fill, which loses its definition at about 7 feet.
5. Brown sand layer with an irregular bottom and a level top, apparently water laid.
6. Coarse brown sand layer, also apparently water laid.
7. Coarse pebbly brown sand fill, with a pebble surface, containing anthracite lumps.
8. Iron-rich red sandy layer mixed with black and gray muck. The bottom is extremely irregular and protrudes into the black muck layer below.
9. Dense black muck, filled with rotten vegetable matter.
10. Yellow gravelly sand fill.
11. Brown loamy clay fill, merging with layer 4 near the surface at the edge of the raceway depression.
12. Relatively lighter brown loam.
13. Dense clay fill.
14. Intrusive clay mass.
15. Gravelly sand fill around the drain structure, stratum 19
16. Yellow clay fill on top of the black muck
17. Drainage structure, containing a 1' by 6" board with two drain tiles and a stone structure.
18. Black muck resting on the subsoil and extending beyond the end of the trench.
19. A second drain structure, but without the stone wall above.
20. A layered deposit of brown and grey dense soil with considerable fibers.

A clay bank, stratum 13, raised the race by a foot. This race was filled with gravel, stratum 7, and the topsoil, stratum 12, developed over the clay.

Sticky brown clay loam was then piled up, to create the final profile of the race wall. This probably was Colonel duPont's attempt to radically increase the dam's power output by adding more than three feet to the head of water.

Each increase in the height of the race required, naturally, a corresponding increase in the elevation of the dam. The present dam, which has a concrete face, obviously dates from Colonel duPont's time or later. Previous dams, wherever they might have been located, are outside the study area.

The last stage of the race was well kept. Clean sand, strata 5 and 6, accumulated in the bottom, but there was no muck.

The loam layer, stratum 4, may have been part of a repair, or it may have been eroded in after the race was abandoned. Strata 2 and 3 represent deliberate filling; the rounded pebble layer at the top of stratum 2 probably was a pavement, as was the crushed gravel at the top of stratum 1.

At the toe of the raceway berm was a stone structure that proved to be a covered tile drain (PLATES 14 AND 15). It divided the raceway from the meadow beyond, and marked a change in the strata.

The drain was built by first digging a trench into the subsoil 18" wide. A 1' by 6" board was then laid into the trench. A double row of drain tiles was laid on the board and mortared together with a black mastic.

Flat stones were set on edge beside the tiles and a row of stones was set as a roof over the structure. Rocks were then piled on top, to create a dry-laid stone structure about a foot high above the tile. Since this drain was parallel to the race, it probably was intended to intercept any groundwater seeping out of the race. A second drain, without the elaborate covering structure, was found farther along the trench, crossing in a diagonal direction (FIGURE 8).

Just above the lower drain was a feature consisting of layers of brown and grey clay, with many fibrous inclusions.

Like the previous test, this cut filled with ground water, but it was large enough that the rising water did not outrun the recording process. When the tile drains were opened, they flowed with water, indicating that the old system was still functioning to some extent.

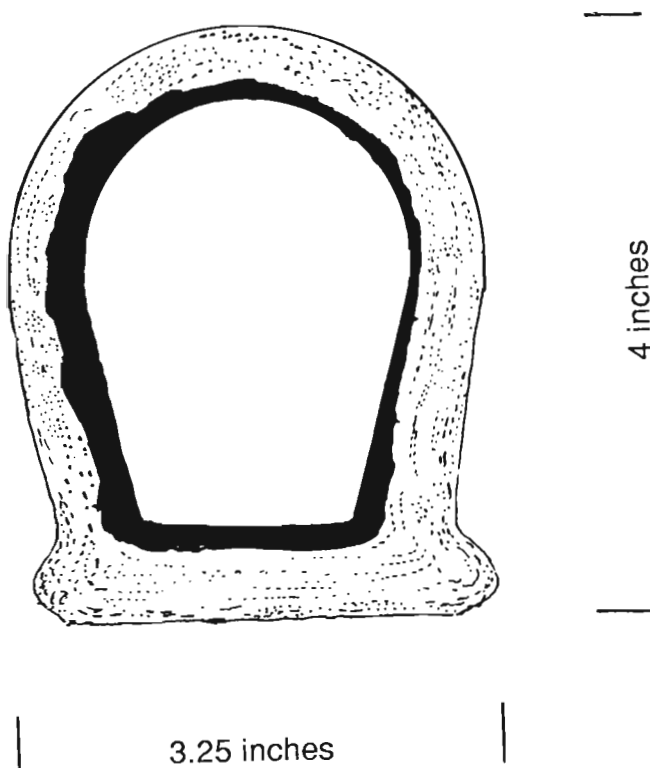


Figure 8
Cross section of a drain tile

The only artifact recovered was a section of extruded red-clay drain tile, illustrated above (FIGURE 8), 13.5 inches long. It was turned over to the Island Field Museum for preservation under accession number 90/55.

Since the mill race will be disturbed by construction of the new intersection, it

was determined that an appropriate survey objective would be to make a topographical record of the race. The hydraulic system of any mill depends upon maintenance of a constant "head" or elevation from which water falls into the turbine or wheel.

Excavation had shown that the race had gone through several enlargements, culminating in the berm visible now. This berm is discontinuous, having been broken by Thompson's Bridge Road and by the small unnamed tributary stream that flows in from the southeast under Bridge 71.

Above the bridge are two cast-concrete dams (PLATE 1, PAGE 3). The lower dam, near Thompson's Bridge Road, is too low to have been the mill dam, but the upper dam appears to be close to the correct elevation.

Along Route 100, earthworks appeared to be remnants of the race, but it was not possible by cursory inspection to tie together all the parts of the hydraulic system.

In particular, a notch in the upper dam appeared to be the remains of a headrace gate. Only a topographical survey would be able to confirm that all these parts belonged to the same system.

A Department of Transportation survey party came to the site November 15, 1990 and prepared a survey of the race, which is abstracted in Figure 9, page 26. The surveyors ran a line of levels along the berm from the dam down to the mill ruins, which are not visible from the intersection. The survey ends at the mill's guard gate, just above the inlet to its turbine pit.

In spite of more than a half-century of weathering, the top of the race berm remains about 218 feet above sea level, which is also the probable head at both the mill (PLATE 13, PAGE 28) and the dam. This survey data confirms that the existing upper dam is at the same level and location as the last mill dam. In fact, it probably is the same dam, but its interpretation is outside the scope of this report.

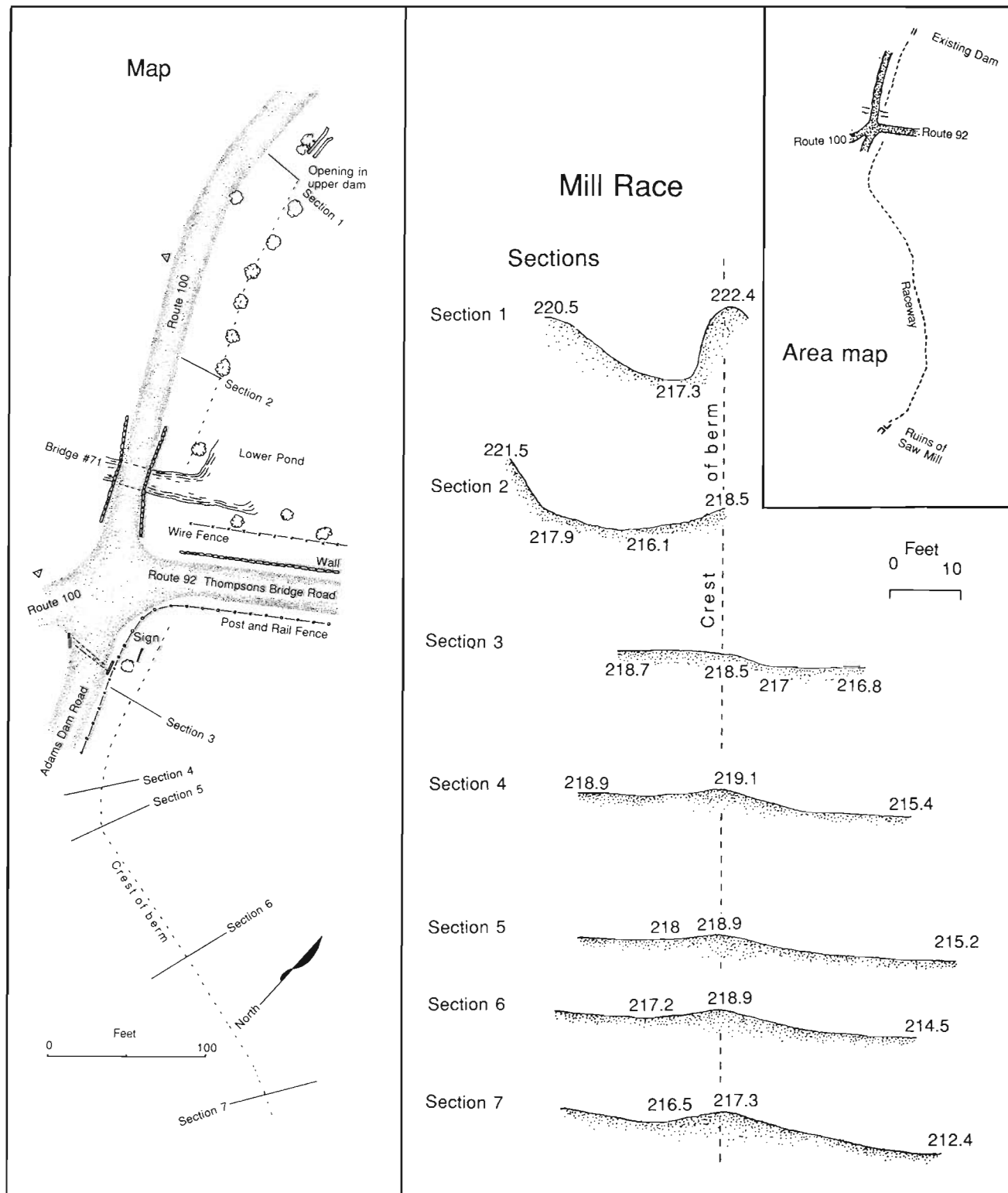


Figure 9
Survey of the mill race

7. EVALUATION AND ASSESSMENT OF IMPACT

THE PROJECT area at Wilson's Run possesses considerable historical interest because of its association with the industrial and labor history of the Brandywine Valley. While only part of the project area is on the National Register, the entire project area is proposed for registration under an expanded nominator (Bower 1990).

Archaeological testing in the project right-of-way affirmed earlier conclusions by Blume (1990:20) that no prehistoric remains are likely to have survived in this locality. Most significant of the cultural remains is the complex of superimposed races that powered the saw and grist mills a short distance down Wilson's Run.

Stone walls in the project area (PLATE 12), like others in the neighborhood, are monuments to an industrial period when working conditions could be at once benign and hazardous. Folklore surrounding duPont farm stonework may not be precisely historically accurate, but it highlights deeper currents in local culture history. These currents of ethnic tension, labor conditions, and immigration need to be studied in a larger context, but are outside the scope of this paper.

The entire complex of walls is probably significant under criterion D, properties that have contributed, or can be expected to contribute, to our knowledge of the history of the stonemason's craft. The short segments in the project area, as artifacts, contribute to the integrity of the whole group of walls.

The race (FIGURE 9) is a contributing, indeed, essential, part of the mill complex (PLATE 13), which in turn is integral to the history and significance of the Winterthur property. The mill site is incomplete without the race and the dam; any impact on the race has a direct effect on other elements of the mill seat.

A counterfeit milestone (PLATE 16) in the project area is significant as an example of the fakery that was accepted during the early days of the preservation movement. Although it possesses no significance in the history of transportation, it typifies an era when the milestone was almost an obligatory feature of any "old time" road scenery. It is not eligible by itself to be listed in the National Register of Historic Places.

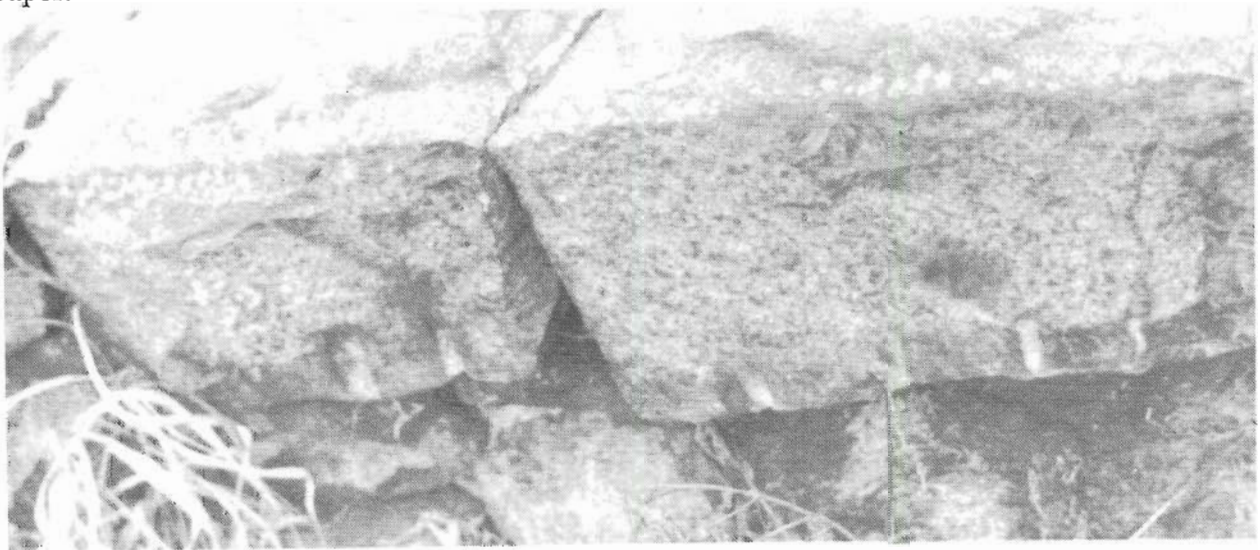


Plate 12

Detail of dressed rectangular capstones on a rubble-style wall along Thompson's Bridge Road

ETHNIC HISTORY

Brandywine Valley's rich heritage of stonework bears witness to the immigration of skilled workers to industrial America during the nineteenth century. Wilmington's Italian-American community owes a significant historical debt to the factories and railroads of the Brandywine, where skilled stoneworkers found ready employment. Even today, in the popular mind, stonework in and around the duPont powder mill complex is identified as Italian in origin, as distinguished from the plant work force, which is perceived to have been largely Irish.

Labor and hiring arrangements among immigrant stoneworkers bears further investigation by a labor historian. The presence of contract labor bosses in such an integral part of the industrial scene has not previously been discussed by historians.

Such apparent exploitation of one nationality in contrast to paternalistic treatment of another group is also a subject that deserves exploration.

Different levels of fortunes of these two communities could possibly be traced to prejudice or some other attitude held by the exploiting class, but worker exploitation is a subject more easily handled by labor historians than by archaeologists.

MILLS

Water powered saw and grist mills were ubiquitous in Delaware from earliest settlements until the end of the nineteenth century.

In 1804, Christiana Hundred reportedly had two sawmills, five gristmill and sawmill combinations, and nine gristmills. In 1822, another survey found only seven gristmills and two combination mills in the hundred (Scharf 1888:885-886).

Other power sources were embraced by the flour and lumber industries for very practical reasons related to location, reliability, and expense. During the latter years of the nineteenth century, water power was perceived to be a dying branch of industry.

In fact, the use of water power was actually increasing during the late nineteenth and early twentieth centuries, but its market share was slipping as coal and oil power became more efficient. New applications of water power were different from the old ones, and were almost exclusively hydroelectric.



Plate 13

Colonel duPont's sawmill
old photo courtesy DNREC



Plate 14

Overall view of the machine-cut trench, unit 6, through the sawmill race, with tape measure strung level for recordation. The road in background is the road to Rockland, at left. Note the draintile structure, shown in the detail below.

Plate 15 (below)

Detail of draintile structure, as found, with the board and stones. Note extreme wetness in the trench. The tiles lay in a double row, on a prepared board. The tiles were protected by a roof and walls of stone.



A few profitable water-powered saw and grist mills have survived to the present, but not because water power is superior to other power sources. Water-powered grist mills, which outnumber water-powered saw mills by a large degree, have survived either because of a remarkably reliable water source, or because no costly repairs have been required. Grist mills in more recent times have often been too marginal to survive the expense of equipment failure or a dam break.

The mill on Wilson's Run is an exception to the historical pattern. In an era when water-powered saw mills were becoming all but extinct in Delaware, Colonel duPont built a modern mill with concrete control structures and up-to-date machinery, powering it from a totally rebuilt mill race.

Instead of reflecting trends in the history of saw mill operations, the Wilson's Run mill may reflect a wealthy industrialist's commitment to the future of water power, notwithstanding powerful indications to the contrary. This is the same person who built a hydroelectric plant in the powder yard and strung wires to his own house.

Such commitment to water power makes sense, considering the fact that the owner had spent his career in the water-powered duPont black-powder mills, where safety and economics continued to favor water power.

But black powder and water power were disappearing from the explosives industry. Smokeless powder, manufactured in new factories, was supplanting the traditional product of Hagley, which closed in 1921 (Munroe 1979: 238) and reopened three decades later as a museum.

Colonel Henry duPont died five years after the Hagley yard closed. The great hay farms, and his own Winterthur estate, became residential sites for a new generation whose attachment to the manufacturing process and to agriculture was not intimate. Company employees no longer worked on farms, which ceased to have a role in the industrial process.

With its concrete dam and concrete control structures, the mill race has no integrity if it is viewed as a remnant of the

period when water power ruled American industry. Instead, what survives today provides a glimpse into the private life of a very public person, Colonel Henry Algernon duPont, industrialist, Medal of Honor recipient, United States Senator, and the last head of the old Company.

GENTEEL HISTORICAL FICTIONS

Historical fakery was a distinguishing characteristic of early twentieth-century historic preservation. In the days before scientific restoration and professional research for preservation, genteel fiction mixed liberally into the facts where a good story might be appropriate.

A popular folly was the milestone. "Historic" old milestones proliferated, imbedded in the popular imagination by New England writers and historical artists who sprinkled them across a fictional historic landscape (PLATE 16, NEXT PAGE).

While there are a few original historic milestones along former turnpikes in Delaware, the one along Route 100 in the project area is not among them. It is clearly a modern forgery, larger and more clearly cut than any of the surviving originals.

Some milestones were moved to new, more picturesque sites, while others were improved. The one at the corner of Naamans Road and Route 13, for example, was moved circa 1915 to a more prominent position and endowed with the Penn arms, even though it actually was placed along the turnpike long after the end of the Penn proprietary.

ELIGIBILITY AND EFFECT

The mill race and the stone walls in the project area are parts of larger industrial resources that almost certainly are eligible for the National Register under criterion D. If a "chateau country" theme is ever developed, the milestone might be included.

The tested section of race has yielded considerable information about mill power system construction, and the system probably could be expected to yield more information. The section inside the project area probably has yielded as much as can be expected.

The road will cross part of the mill race that has lost considerable integrity. The

best-preserved parts of the system lie on park property, where they are protected. Construction of the road can be expected to do little, if any, damage to the power system.

Although they may possess æsthetic attraction, the walls are most significant as examples of the varied workmanship of different workers under different conditions at different times. Each wall is an archaeological resource, containing in its structure a body of information regarding builders' training, origins, and working conditions. They are the most durable and visible evidence for the earliest phase of Italian immigration into Delaware.



Plate 16

Modern imitation of a historic milestone, located near Adams Dam in the project area along Route 100 (N-12669)

RECOMMENDATIONS

Hydraulic data about the mill is potentially the most significant resource to be lost when a race is cut. Demolition of the existing Adams Dam and Thompson's Bridge roads could obliterate part of the mill's hydraulic power system. The survey reported here will preserve much of the evidence, especially concerning the vertical relationship between the dam and the mill elevations.

Where the road crosses the old race system, gates or bridges may have been preserved by the perpetual subgrade wetness. This area should be watched during construction.

One wall segment is scheduled to be removed from the new route of Thompson's Bridge Road. Another segment, between Bridge 70 and the intersection, has already suffered considerable damage and will no longer be in its original context adjacent to the road. Avoidance would be, as always, the preferred treatment. If the wall cannot be avoided, the alternatives are to move, reproduce, or demolish it.

If a wall must be moved, it should be moved in one piece, to preserve the original workmanship, consistent with the Secretary of the Interior's standards. While a rebuilt or reproduced wall might replicate the mere superficial appearance of the original artifact, modern workers can hardly be expected to understand, much less duplicate, nuances of nineteenth-century stoneworking. Since the walls possess significance primarily as a document of workmanship, any rebuilding would destroy the integrity of the walls and render them worthless in terms of National Register criterion D.

Thus, if the wall cannot be avoided, the most prudent treatment consistent with the guidelines might be to allow its destruction after documentation. Reconstruction would be inappropriate, and would contribute nothing to the historical environment.

A superficially similar rebuilt wall could hardly be justified in terms of historic preservation, any more than a faked milestone is an authentic "colonial" road marker.

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INFORMANTS

Donald Blevins, stone mason, Hagley Museum, interviewed September 13, 1990.

Robert Howard, curator, Hagley Museum, interviewed September 13, 1990.

John Rumm, former Hagley Fellow and now editor at the Papers of Joseph Henry, Smithsonian Institution, interviewed October 11, 1990

Plate 17

The author attempting to record the machine cut at Route 92 and Route 100 as the waters rose; the road to Rockland is in the background

